

STUDIES IN THE HELIANTHEAE (ASTERACEAE). VII.

NOTES ON THE GENUS, MONACTIS

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C. 20560.

Efforts to identify members of the Heliantheae from Ecuador have shown a concentration of problems in the genus Monactis. Neither Monactis nor the segregate genera Astemma Less. and Monopholis Blake have been reevaluated since their original description and treatments at the species level have been erratic. The present preliminary revision attempts to properly delimit the genus Monactis and provides necessary new species descriptions and new combinations. Concepts are summarized in two provisional keys to the Ecuadorian and Peruvian species.

The genus Monactis was originally described in Nova genera et species plantarum by Humboldt, Bonpland and Kunth in 1818 to include two species from the northern Andes. The characters emphasized were "involucrum oligophyllum, imbricatum, pauciflorum. Receptaculum paleaceum. Flosculi disci nonnulli, tubulosi, hermaphroditi; radii subsolitarius, ligulatus, femineus. Akenia calva." The name was derived from the single-rayed heads of the first species, M. flaverioides HBK, resembling the condition found in members of the genus Flaveria. The species is sometimes cited as Ecuadorian but the type locality is given as near Jaen which is in Cajamarca, Peru.

The second species of Monactis, M. dubia HBK of southern Ecuador was described as lacking rays and having reduced stamens. It was suggested that the species was dioecious and on the basis of this suggestion Lessing in 1832 removed the second species as a monotypic genus, Astemma. Fragments of the type in the U.S. National Herbarium show that the anthers are aborted but this is regarded as an indication of apomixis rather than a dioecious condition. Other features of the species agree with Monactis and the species is close to if not the same as M. holwayae.

Bentham and Hooker (1873) recognized both Astemma and Monactis, the former distinguished as dioecious and the later being placed in a group with inner phyllaries investing the ray achenes. Two species of Monactis were cited without providing names and the nature of the supposed second species

remains unknown. Another species was not named in the genus until Monactis jelskii of Peru by Hieronymus (1905).

In addition to a species of Monactis, Hieronymus described two species of Chaenocephalus, C. pallatensis (1900) of Ecuador and C. jelskii (1905) of Peru. These latter two species were included by Blake (1922) in his new genus Monopholis with two new species, M. hexantha and M. holwayae of southern Ecuador. The genus was typified by M. hexantha. Blake distinguished the genus from the imperfectly known Monactis by the form of the achenes with their single pappus squama. Examination of specimens of Monactis and Monopholis indicates great uniformity of all significant characters except the pappus and the latter is somewhat variable in some species. The pappus distinction was ignored by Chung (1967) in the description of Monactis pentlandii which is evidently a synonym of Monopholis holwayae. There seems to be no reason to continue the distinction of Monopholis and it is regarded here as a synonym of Monactis.

B.L. Robinson (1911) described one other species, Monactis subdeltoidea, having 25 flowers per head and having numerous rays. The species differs from any others placed in Monactis by the numerous flowers, the many phyllaries, the achenes being prismatic and slightly curved from a conical receptacle, and the corollas having short somewhat inflexed lobes and cylindrical throats. The species is not a Monactis but is a synonym of Zaluzania sodiroi Hieron.

The genus Monactis can be delimited by the following combination of characters.

Monactis H.B.K., Nov. Gen. et Sp. 4: 225, t.403. 1818, ed folio. Lectotype: Monactis flaverioides HBK.

Astemma Lessing, Syn. Comp. 216. 1832. Type: Monactis dubia H.B.K.

Monopholis Blake, Bot. Gaz. 74: 416. 1922. Type: Monopholis hexantha Blake

Spreading shrubs with stems often deflected at nodes in zigzag pattern. Leaves alternate, basal wingless portion of petiole short; blade ovate, acute or slightly acuminate, base decurrent on upper half of petiole, trinervate from above base, upper surface scabrid and sparsely glandular-punctate, lower surface thinly to densely tomentose. Inflorescence terminal on branches, massive, corymbose, with branches widely

ascending and bearing decurrent ribs. Heads numerous, sessile or on short pedicels; receptacle small and convex; involucre bracts few, non-herbaceous, in ca. 2 series, with margins or tips narrowly scarious; paleae similar to involucre bracts, larger bases of bracts and paleae partially enclosing bases of achenes; rays 0-2 (3?), female, corolla yellow, tube slender and hirtellous, limb smooth; disk flowers 6-12, corollas yellow; tube thickened at base, narrowed above; limb broadly campanulate, about as long as wide; lobes about twice as long as wide, strongly reflexed at maturity; anthers black, appendages infuscated, glands on connective and appendages; median exothecial cells mostly twice as long as wide, 2-3 nodules on transverse walls, none on sides; nectary narrowly cylindrical without obvious lobes, stomates on upper edge; style immersed about $1/3$ into nectary, with distinct small basal node; tips of branches obtusely acute with only papillae extending beyond stigmatic surfaces, longest sweeping hairs in band at base of deltoid tip, inner surface with two stigmatic lines; achenes straight, fusiform, subrostrate above, trigonous to quadrangular, black at maturity, glabrous; carpopodium asymmetric with vein exiting laterally, cells quadrate on the attachment side, longer on the other side, walls firm but only slightly thickened; pappus lacking or with single squama, rarely with two squamae. Pollen ca. 27μ in diameter, hispidulous.

The most distinctive features of the genus are the coarse alternate leaves and the small heads with few rays or disk flowers. Particularly distinctive are the broadly campanulate throats of the disk flowers and the fusiform trigonous to quadrangular achenes. The genus has some superficial resemblance to Verbesina but the achenes are entirely different and there seems to be no close relationship. Closer relationship may exist with Zaluzania which differs primarily by its larger heads with more flowers and by its differently shaped achenes and disk corollas.

The limited number of specimens and the apparent variation in species results in few specimens agreeing in all characters. As a result the taxonomic value of the various characters has been difficult to determine. One feature, the presence or absence of hairs on the tube of the disk corollas seems consistent for a given specimen but seems to vary within species. Flower number per head often seems to be limited in single specimens but more variable in a species. More reliance has been placed on pappus which is present on

many achenes in some species but is completely lacking in others. Stem pubescence has a similar limited consistency. Long pubescence is characteristic of M. pallatangensis and M. wurdackii but this may be glabrescent as in one specimen seen of the former. Stems of other species such as M. holwayae and M. kingii are, in contrast, always short-puberulous. Rays are also limited to only some of the heads in species where they occur but they are sufficiently numerous to mark the distinction from the rayless species, M. dubia and M. holwayae. Leaf characters seem generally uniform throughout the genus, but M. pallatangensis seems markedly more bullate on the upper surface than any other member of the genus, and M. flaverioides and M. jelskii of Peru seem to have a distinctive subentire leaf margin not seen in other species.

Ecuadorian Species

Four species are recognized from Ecuador with some question regarding the distinction in the rayless forms. The species can be distinguished by the following key.

1. Plants with rays

- 2. Upper leaf surface distinctly minutely bullate; stems hirsute M. pallatangensis
- 2. Upper leaf surface smooth or nearly smooth, not bullate; stems short puberulous . . . M. kingii

1. Plants without rays

- 3. Anthers aborted, reduced M. dubia
- 3. Anthers normal sized, exerted at maturity
M. holwayae

Monactis dubia H.B.K., Nov. Gen. et Sp. 4: 226. 1818,
ed folio. Ecuador: Valle Tarquensi, 1300 hex.

Astemma dubium (H.B.K.) Lessing, Syn. Comp. 216.
1832.

The anther reduction of the original description has been confirmed in the few corollas of the type preserved in the U.S. National Herbarium. However, this is taken as evidence of apomixis rather than a

dioecious condition. The anther condition is the only certain distinction between this species and the later described M. holwayae and both species are from the same area near Cuenca in southern Ecuador. Another difference between the species might be the lack of pappus described in M. dubia. The fragments seen show no pappus but the material is too sparing and too immature. The other three Ecuadorian species all have a pappus.

Monactis holwayae (Blake) H. Robinson, comb. nov.

Monopholis holwayae Blake, Bot. Gaz. 74: 419. 1922.
Ecuador: Cuenca, Holway & Holway 989 (US).

Monopholis hexantha Blake, Bot. Gaz. 74: 418. 1922.
Ecuador: Cuenca, Holway & Holway 973 (US).

Monactis penlandii Chung, Phytologia 14(6): 324.
1967. Ecuador: Banos near Cuenca, 2600 meters,
Penland 1068 (isotype US).

The two Blake species were distinguished in his key by supposed differences in pedicel lengths, and examination of the type of Monopholis holwayae does show a denser inflorescence. The inflorescence difference seems, however, to be entirely an artifact of partial immaturity. Age effects not only the density of the inflorescence but also the size of the heads as paleae and achenes become more elongate. Another described difference between the two species is the 6-7 flowers per head in Monopholis hexantha versus the 8-11 in M. holwayae. Individual specimens do seem to have a limited range in flower number, still, some heads of the type of M. hexantha have as many as 8 flowers while other specimens have 7-8, 7-9 and 8-10. The specimens with lower numbers of flowers per head often have narrower leaves and narrower less ridged stems, but these characters do not correlate sufficiently with others. Such plants might simply be from more exposed habitats.

The Chung species seems to have been described in Monactis without knowledge of the species that had been described in Monopholis.

Monactis holwayae is almost completely restricted to the Province of Azuay in Ecuador. One specimen has been seen from, ECUADOR: Cañar: near El Tambo; 9500-10,000 ft. elev., Camp 2429 (NY). This latter is from within the range of M. kingii.

Monactis kingii H. Robinson, sp. nov.

Plantae frutescentes vel subarborescentes usque ad 5 m altae laxae ramosae. Caules teretes vel subangulares striati minute puberuli. Folia alternata, petiolis 0.5-1.5 cm longis; laminae ovatae plerumque 7-12 cm longae et 3-7 cm latae fere ad basem trinervatae base late cuneatae vel subtruncatae subabrupte in petiolis decurrentes margine serratae vel serrulatae apice leniter acuminatae supra non bullatae scabridulae et glanduliferae subtus canescentiter tomentellae in nervis et nervulis saepe fulvo-tomentellae. Inflorescentiae irregulariter corymboso-paniculatae in ramis foliosae, pedicellis 0-2 mm longis minute dense puberulis. Capitula ca. 8-9 mm altae et 3-4 mm latae. Squamae involucri ca. 8 brunnescentes oblongae 2-4 mm longae et 0.5-1.0 mm latae margine indistincte scariosae hirsutae extus puberulae glabrescentes apice anguste rotundatae; paleae squamis involucri similes anguste oblongae 5-6 mm longae et 1.0-1.5 mm latae base achaeniorum parum investientes extus evanescentiter hirsutae glanduliferae. Flores radii 0-2 feminei; corollae flavae, tubis ca. 1 mm longis puberulis, limbis 5-6 mm longis et 2.5-3.5 mm latis apice breviter trilobatis extus pauca glanduliferis. Flores disci 9-10 hermaphroditi; corollae flavae 3.0-3.5 mm longae, tubis ca. 1.0-1.5 mm longis extus hirtellis et glanduliferis vel subglabris, faucis late campanulatis ca. 1 mm longis et latis glabris, lobis ca. 1 mm longis et 0.4-0.5 mm latis glabris vel subglabris; thecae antherarum ca. 1.2 mm longae; appendices ca. 0.3 mm longae. Achaenia fusiformia 4-5 mm longa nigra subtrigona; squama pappi solitaria raro nulla membranacea ca. 1 mm longa oblonga.

TYPE: ECUADOR: Cañar: along the Pan-American Highway (route 1) ca. 2 kms SE of Cañar. elev. ca. 10,400 ft. Several small shrubs or trees to 2 meters tall, open sun, flowers yellow, King 6620 (holotype US; isotypes MO, NY). Paratypes: ECUADOR: Cañar: along the Pan-American Highway (route 1) ca. 13 kms NW of El Tambo. elev. ca. 7800 ft. Abundant small trees, ca. 4-5 meters tall, flowers yellow, King 6623 (US, MO, NY); Dry chaparral scrub and Paramo, with occasional moist valleys, near El Tambo (ac. 69 km by RR south of Sibambe); 9,500-10,000 ft. elev. Lvs. deep green, subscabrous above; pale pubescent below. Bracts green, tipped with yellow. Corolla yellow. Anthers dark brown; stigmas yellow. One flower in head often ligulate. Gilar says that, previously in this region, he has seen this occasionally with two ray flowers in

the head . . . , Camp 2440 (NY); between Tambo and Suscal. North rim of the valley of the río Cañar. Shrubby, 3 m. Plants with many heads with 2 ligulate fls., Camp 2785 (NY).

Monactis kingii superficially resembles M. pallatangensis of the Province of Chimborazo by the presence of ray flowers. Both the upper leaf surface and the stem pubescence indicate a closer relation to M. holwayae of Azuay. There is a tendency for M. kingii to have more broadly ovate and less decurrent leaf blades than are found in M. holwayae but there seem to be exceptions, especially in the rayless specimen from Cañar that has been determined as M. holwayae in this study.

Monactis pallatangensis (Hieron.) H. Robinson, comb. nov.

Chaenocephalus pallatangensis Hieron., Bot. Jahrb. 29: 47. 1905. Ecuador: in valle Pallatanga, Sodi 38 (frag. US).

Monopholis pallatangensis (Hieron.) Blake, Bot. Gaz. 74: 419. 1922.

The rougher upper leaf surface and the hairier stems distinguish this northernmost member of the genus. One specimen (E.L. Little 6764, US) does not show the longer pubescence, but this is the most mature specimen of the species and the stems are apparently glabrescent.

Peruvian Species

Limited material prevents any definitive results but four species seem to be present.

1. Leaf margins subentire, with remote partially recessed minute mucronations
2. Pappus lacking; stems lanate, glabrescent?
M. flaverioides
2. Pappus present on most achenes; stems hirtellous
M. jelskii
1. Margins of well-developed leaves distinctly serrate
3. Leaf margins with remote blunt teeth; stems puberulous; pappus present . . . M. hieronymi

3. Leaf margins closely and often sharply serrate;
stems densely villose or lanate; pappus never
present M. wurdackii

Monactis flaverioides H.B.K., Nov. Gen. et Sp. ed. folio
4: 225. 1818. Peru: Provincia Bracamorensi, inter
urbem Jaen et ripam fluminis Amazonum, alt. 250
hex.

Monactis flaveriae DC., Prodr. 5: 546. 1836.

The species was originally illustrated with
obtusely acute leaves unlike any other in the genus. A
microfiche of the type specimen indicates the leaf tips
are badly broken and that aspect of the illustration
seems to have been an erroneous reconstruction. The
microfiche also indicates that the illustration over-
emphasizes the marginal teeth which were originally
described as "Folia . . . margine denticulis minutis-
simis obtusis valde remotis instructa." Also, the
original genus description says, "Arbores foliis
alternis integris: . . ." As such, the species seems
closest to Monactis jelskii having thinner nearly
entire leaves. The branches were originally described
as "ramulis . . . glabriusculis" and the achenes are
without a pappus, a combination not matched by more
recent collections in the genus. It seems likely,
however, that the described stem pubescence represents
a glabrescent condition such as is seen on older stem
parts in two specimens from Peru cited below. It is
notable that the puberulent condition which is noted
in the original description of M. dubia by the same
authors, does not seem to be as glabrescent.

PERU: AMAZONAS: Chachapoyas: Mathews (NY);
Chachapoyas: cerca a Leimebamba, habitat matorral,
alt. 2200-2300 m, arbusto 1.50-2 m de alto,
Ferreyra 15547 (US).

Monactis hieronymi H. Robinson, nom. nov.

Chaenocephalus jelskii Hieron., Bot. Jahrb. 36: 494.
1905. Peru: prope Tambillo, Jelski 698
(isotype US).

Monopholis jelskii (Hieron.) Blake, Bot. Gaz. 74:
420. 1922.

The new name is necessary since the combination
Monactis jelskii is preoccupied. The species seems

closest to M. wurdackii as noted under that species. The species is known only from the type collected in eastern Piura, Peru.

Monactis jelskii Hieron., Bot. Jahrb. 36: 486. 1905.
Peru: prope Cutervo, Jelski 684 (isotype frag. US).

The species seems close to material tentatively included here under M. flaverioides, but the type differs by its puberulous rather than villous stems and its pappus of one or even two squamae.

Monactis wurdackii H. Robinson, sp. nov.

Plantae frutescentes usque ad 5 m altae laxae ramosae. Caules teretes striati dense villosi. Folia alternata, petiolis 1.5-5.0 cm longis; laminae ovatae plerumque 8-14 cm longae et 4.5-9.0 cm latae supra basem trinervatae base late cuneatae subabrupte in petiolis decurrentes margine in foliis inferioribus distincte vel grosse serratae apice acutae vel subacuminatae supra non vel vix bullatae scabridulae et sparse glanduliferae subtus canescentiter tomentellae in nervis et nervulis plerumque fulvescentes. Inflor-
escentiae irregulariter corymboso-paniculatae in ramis foliosae, pedicellis 0-3 mm longis dense hirtellis. Capitula 8-10 mm alta et 3-4 mm lata. Squamae involucri ca. 10 flavo-virides vel brunnescentes oblongae 2-5 mm longae et 0.5-1.0 mm latae margine indistincte scariosae hirsutae extus puberulae glabrescentes apice rotundatae; paleae squamis involucris similes anguste oblongae 5-7 mm longae et ca. 1 mm latae base achaeniorum parum investientes extus evanescentiter hirsutae glanduliferae. Flores radii 0-2 feminei; corollae flavae, tubis ca. 1 mm longis puberulis, limbis 7-8 mm longis et 2-3 mm latis apice minute trilobatis. Flores disci ca. 8-10 hermaphroditi; corollae flavae 3.5-4.0 mm longae, tubis ca. 1.5 mm longis extus hirtellis vel glabris, faucis late campanulatis ca. 1 mm longis et latis glabris, lobis ca. 1.3 mm longis et 0.6-0.7 mm latis glabris vel subglabris; thecae antherarum ca. 1.3 mm longae; appendices 0.3-0.4 mm longae. Achaenia ca. 5 mm longa nigra subtrigona vel subquadrangularia; pappus nullus.

TYPE: PERU: Amazonas: Chachapoyas: Rock quarry 1 km southwset of Chachapoyas, elev. 2300 m, Shrub 3-5 m. Rays 0-2, yellow; disc yellow. Locally frequent. Chromosom number $n = ca. 30$ (B.L. Turner). May 22, 1962. Wurdack 452 (Holotype US; isotype NY).

Paratypes: PERU: Amazonas: Entre Conila y Cohechán. Soukup 4131 (US); CAJAMARCA: Celendin: Canyon Rio Marañon above Balsas, 5 km below summit of road to Celendin. Shrub ca. 4 m. Leaves crisp, densely pubescent beneath. Pubescent stems red-violet toward apices. Rays lemon yellow, disks golden yellow. usually one or two rays per head. Alt. 2930 m. May 24, 1964. Hutchison & Wright 5319 (US, NY).

The new species seems distinct in the closely serrate leaves and in the densely villous stems and petioles. The nearest resemblance is to M. hieronymi which has more remote blunt teeth on the leaves, puberulous stems, and achenes often bearing a small pappus.

There is an additional specimen from Chachapoyas collected by Mathews (K not seen, NY, photo US) which seems close to Monactis wurdackii but it has short pubescence on the stem.

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PLANTS OF ECUADOR

R. 10

NATIONAL HERBARIUM

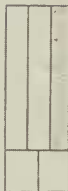
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NATIONAL HERBARIUM

Monactis kingii H. Robinson, Holotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Monactis kingii H. Robinson, enlargement of heads.



SMITHSONIAN PERUVIAN EXPEDITION
Departamento de Amazonas, Provincia de Chachapoyas

Monopholis jilaki (Hieron.) Blake
JC!

Throosome rather fl. ca. 1/2 in. diam. Small fl. ca. 1/2 in. diam., yellow; fl. yellow. Locally frequent.

Monactis wurdackii H. Robinson
1-1-88

Rock quarry 1 km. southwest of Chachapoyas, alt. 2500 m.
J. J. Wurdack No. 152

22 May 1962

Collected in collaboration with the Museo de Historia Natural "Juan Pablo".
Lima, assisted by a grant from the National Science Foundation

Monactis wurdackii H. Robinson, Holotype, United States National Herbarium.